Zero Retries issue 0114 2023-09-01

Zero Retries is an independent newsletter promoting technological innovation in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Now in its third year of publication, with 900+ subscribers.

About Zero Retries

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor Emeritus

In this issue:

- **Request To Send**
- **GNU Radio Conference - A Few Zero Retries Interesting Talks**
- **Instructive Exchange Between Representative and FCC Chair**
- **New AREDN Software Production Release**
- **ZR > BEACON**
    - **SMT NinoTNC Almost at Pre-Order Stage**
    - **RPC Electronics ESP32-APRS Tracker**
    - **List of VHF/UHF Multimode Amateur Radio Transceivers**
    - **Hack-A-Sat Contest Did Include Amateur Radio Operators**
- **Zero Retries 0114 Poll**
- **Feedback Loop**
- **Join the *Fun* on Amateur Radio**
- **Closing The Channel**

Web version of this issue - https://www.zeroretries.org/p/zero-retries-0114

Request To Send

Editorial by Steve Stroh N8GNJ

Prefers to remain anonymous is the Newest Zero Retries Founding Member

My thanks to new Founding Member 0004 who prefers to remain anonymous, joining:
Founding Member 0000 - Steven Davidson K3FZT
Founding Member 0001 - Chris Osburn KD7DVD
Founding Member 0002 - Don Rotolo N2IRZ
Founding Member 0003 - William Arcand W1WRA

If you'd like to financially support Zero Retries, becoming a paid subscriber is *greatly* appreciated and helps offset expenses incurred in publishing Zero Retries. Paid subscriptions for Zero Retries are *entirely optional*, as explained in this special issue of ZR - Zero Retries Administrivia - Activating Payment Options.

Proud Parents

As you read this, the preceding week has been busy for my family preparing for the wedding of our daughter Merideth Stroh KK7BKI to Max Pepper on Sunday, September 3, 2023 in Portland, Oregon. My wife Tina KD7WSF and I have been *blessed beyond reason* with Merideth as our daughter, and our blessings have continued in Merideth and Max's mutual choice of each other. I proposed having a "special event HF station" at the wedding, but that idea was vetoed by Tina.

With all this joyful activity and so many friends and family to spend time with, there will be little time for the longish process of writing an issue of Zero Retries from scratch (or, just filling in the template 😊). Zero Retries 0114 (this issue) and Zero Retries 0115 will be mostly written in advance without my usual daily editing during the week prior to publication as new developments emerge.

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GNU Radio Conference - A Few Zero Retries Interesting Talks

By Steve Stroh N8GNJ

The 2023 GNU Radio Conference (GRCon) begins next week. It's one of those conferences / areas of interest that aren't quite Amateur Radio, but are adjacent to Zero Retries Areas of Interest. I hope to attend GRCon, perhaps in 2024, and do a Zero Retries Perspective on it. For other such conferences, see the Zero Retries Guide to Interesting Conferences.

For decades now, it's been the case that electronic units almost always have an element of, or are now *mostly* software. Incorporating a processor is simply the most cost-effective, simplest, and fastest method to implement an electronic circuit or system. We're now nearly at that same threshold of radio technology, and what BASIC (or, perhaps, PASCAL) is to computers, the GNU Radio Environment is to Software Defined Radio technology. For beginners in GNU Radio, there is the graphical front end to GNU Radio called GNU Radio Companion which allows one to "drag, drop, and combine" SDR code modules. In 2023, Amateur Radio is well into the transition to Software Defined Radio, and benefits considerably from contributions by those that are proficient with Software Defined Radio technology such as GNU Radio.

Although I have no background in Software Defined Radio (other than a fan and dilettante user), these are some of the most interesting talks I saw on the schedule and would attend them if I was attending GRCon. I hope GRCon will make these talks available on video as some past GRCon talks have been.

Building Basic Data Transmission Systems with GNU Radio

> In this workshop, we'll constructively go through building a simple transmitter and receiver system for a basic modulation scheme, starting from a clean-sheet GNU Radio companion window.
>
> The target audience is users who have used GNU Radio before, but not intensively, or new users. Some DSP basics will be helpful.

We *cannot get enough* of these sorts of getting started in GNU Radio tutorials.

Lunar Internetworking with GNU Radio

> In this paper, we introduce a basic LunaNet GNU Radio library, aiming to make full-stack lunar mission communications and networking easily accessible. The library implements pieces of the LunaNet Interoperability Specification (LNIS) - the protocol suite defined for international commercial and government lunar mission internetworking.
>
> The library is used with GNU Radio, a free, open-source software. LunaNet can be viewed as analogous to the Internet for the moon, and will similarly benefit from an easily available general-purpose stack that works with free or low-cost components (e.g. GNU Radio and commodity software defined radio hardware platforms).

As a child of the 1960s when a permanent base on Luna seemed like a logical, inevitable progression of the US Space Program, ***"LunaNet"*** just leaps out at me.

Keynote: Eric Blossom

> Eric Blossom founded the GNU Radio project in 2001 and ran it as a full-time undertaking through 2010. Eric was responsible for the original architecture and implementation of GNU Radio, including the fundamental concepts of blocks, streaming data, the buffering system, and the first two generations of schedulers. If there's something about GNU Radio that bugs you, there is a good chance that Eric is to blame.
>
> He is deeply grateful for all of the people who have used and supported GNU Radio over the years and particularly to those who have worked to evolve it into a more powerful and useful tool. Eric has spent the last 6 years at Planet Labs, one of the leading "new space" companies, building a family of high speed radios used to downlink imagery of earth from Planet's constellation of satellites. These satellites are in a 500km orbit, and the radios downlink imagery at > 1.5Gb/s, totaling terabytes of data per day across the constellation.

Eric Blossom K7GNU has deep roots in experimentation in Amateur Radio. As an example, see this article - A Different Way to Think About TAPR as one small example of how GNU Radio and Amateur Radio complement each other. The article also mentions Matt Ettus N2MJI, who I've written about previously in Zero Retries, and it's interesting to see how both K7GNU and N2MJI have leveraged their knowledge, in part from Amateur Radio, to create new space technologies.

Amateur Radio, DSP and GNU Radio

> This talk will look at amateur radio's mandate, licensing requirements and the newly-emerging "technologist" versus "communicator" demographic within the hobby. It will describe how gnuradio could be used to teach DSP and SDR techniques to new and existing amateurs (especially those in the "communicator" demographic) with the goal of keeping the hobby relevant and able to continue to advance the radio art in the 21st century.

It seems logical to me that anyone who wants to get proficient with GNU Radio would want to get licensed as an Amateur Radio Operator because it's literally a license to experiment with radio technology… and thus be able to transmit, legally, in a number of portions of spectrum - HF to microwave.

Design of a 1296 MHz SDR Radio System for EME

> EME or Earth Moon Earth communications requires sensitive receivers, relatively high power transmitters and signal processing to be able to communicate by reflecting a signal off the moon. This talk will discuss the system and RF design details in making an EME capable station. The topics include the system link budget, antenna requirements, detailed RF receiver and transmitter design.
>
> The signal processing path will be discussed in detail including the auxiliary control functions for tracking and real time frequency control. Results will be shown for a functioning system.

Dennis Rosenauer AC7FT is an old friend with vast knowledge and capability in radio technology. I've known of AC7FT's EME system in development for a while now and have looked forward to him presenting the details as his system incorporates a number of innovations.

Amateur Radio License Exams

It's good to see that similar to DEF CON, GRCon offers in-conference Amateur Radio license examination.

No Commercial Amateur Radio Sponsors

Kudos to ARDC for being a major sponsor of GRCon23, but it's sad that they are the only "Amateur Radio name brand" sponsor of GRCon23. Clearly Amateur Radio manufacturers *are not getting the message* to get their brand in front of this group of techies that are (by definition) *intensely interested in radio technology*.

GRCon23 looks like it will be, as always, a fun, interesting, highly educational event.

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Instructive Exchange Between Representative and FCC Chair

By Steve Stroh N8GNJ

There is a fraught relationship between (US) Amateur Radio and the (US) Federal Communications Commission (FCC), but a recent public discussion indicates maybe there's hope for progress in updating FCC Amateur Radio regulations.

There was a recent remarkable (to me, anyway) direct acknowledgement of the importance (and even, just the existence) of Amateur Radio in a recent Congressional hearing shown in this recent episode of Ham Radio Crash Course:

Host Josh Nass KI6NAZ does a good job of explaining the scenario and then excerpting the interesting exchanges between Representative Debbie Lesko (Arizona) and FCC Chairperson Jessica Rosenworcel and FCC Commissioner Nathan Simington. Nass also references the original YouTube video from Representative Lesko's YouTube channel[1], and I extracted this very rough transcript from that video:

Rep Lesko Questions The Fcc
20.1KB · PDF file
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As I explain above, time doesn't permit me to dive deeply into this exchange, but I found it… *hopeful*… that *there is direct recognition of Amateur Radio* by at least FCC Chairperson Rosenworcel and FCC Commissioner Simington. In particular, it was instructive that Simington acknowledged that he had been contacted by (individual?) Amateur Radio Operators about this issue, and he specifically mentioned ARRL.

In an email conversation, a knowledgeable friend explained to me that Rocenworcel's statement that "the record is stale" is FCC-speak for:

We did get comments on this issue, but took no action then. Enough time has passed that to proceed on this issue, we probably need to start over.

So, from this, my perspective is:

Bad News - Because the "record is stale" the FCC won't be doing anything in the near term (unless Representative Lesko does follow through with her bill).

Good News - Because the FCC will likely start over to fix the "Symbol Rate issue" (hopefully eliminating *all* Symbol Rates), there will be another chance to raise awareness that specifying (limiting, inane, outmoded) Symbol Rates isn't just an issue for Amateur Radio in the HF bands, but *it's even more limiting, inane, and outmoded for the VHF and UHF bands*.

I explain this issue in more detail in Zero Retries 0078 - US Legislation Proposed to Force FCC to Replace Symbol Limit on HF with 2.8 kHz Bandwidth Limit.

ARRL Appears to be the Conduit for Fixing the Symbol Rate Issue

As critical of, and unimpressed as I am with ARRL's efforts to date on embracing the disruptive nature of new technologies in Amateur Radio of the 21st Century, I reluctantly conclude from the above that the best chance to capitalize on ***this*** *brief window of interest / recognition* of the importance of the Symbol Rate issue… is to work through the ARRL.

Thus, if you're an ARRL member, I suggest that you contact your ARRL officials (all of them) to explain to them that for Amateur Radio of the 21st Century… what's really needed is for all of the Symbol Rate limitations to be removed. Not just for HF bands, but also for the VHF / UHF bands. I think we ARRL members collectively need to specifically reach out to ARRL CEO David Minster NA2AAA[2] - na2aaa@arrl.org to impress on him the importance of including VHF / UHF in their work on removing Symbol Rate limitations.

I'll write more about this in the near future, but for now, please get in touch with your ARRL representatives and start talking up this important issue.

Leave a comment

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Image courtesy of www.arednmesh.org

New AREDN Software Production Release

by Orv Beach W6BI

Here's info on the latest Amateur Radio Emergency Data Network (AREDN) production release of firmware for AREDN devices.

AREDN release 23.8.0

There have been over 70 nightly releases of the AREDN codebase since the last production release in April 2023. Here are the highlights of the latest production release:

Enhancements

- Added Prometheus Metrics (meant for use with monitoring apps like Grafana)
- SSH, TELNET and HTTP access to a node via the WAN port can now be disabled from the advanced configuration page.
- Improved handling of unsupported hardware.
- Use wifi assoc list when looking for unresponsive nodes
- Allow MTU on wifi interface to be modified
- Minor wifi monitor improvements for better metrics reporting
- Merge all the station monitoring and mitigation into a single service
- Support xlinks on x86
- Remove subnet restrictions for xlinks
- Support switching mesh radio on multi-radio devices
- UI improvements from AB7PA
- Upgrade to OpenWRT 22.03.5
- Added Advanced Networking tab
- Feedback when pressing upload/download buttons
- Virtualized X86 support
- Restructure, modularize and tidy up the navigation buttons and menus

- Remove hardwired frequency tables and use information from the hardware instead
- Note devices which support the danger-upgrade process
- Allow the “&” character in service paths
- Added support for group alert messages

Known Issues

- Wifi scanning on Ubiquiti AC devices does not return all found devices, only ones already associated with the node.

New Devices Added

- New LiteBeam AC Gen2 variant
- Mikrotik LDF 5AC
- Mikrotik LDF2
- PowerBeam 5ac-620 support

Bug Fixes

- Fix x86 upgrades (naming is a little odd)
- Fix Mikrotik first install
- Re-enable AREDN’s reset button behavior (was being overridden by OpenWrt’s)
- Revert PowerBeam 5AC 400 name change which caused upgrade problems
- Remove another coverage test which causes problems
- Fix MTU failure which broke node setup
- Avoid error if mac disappears across a radio reset
- Monitor bug fixes
- Fix bug when editing xlinks on single port devices
- Enhance ‘has_wifi’ detection
- Handle non-wifi devices passed to maxpower/pwroffset functions
- Fix LUA converting empty port object to empty array.
- Alternate ath9k and ath10k radio reset for deaf nodes
- Fix API nil pointer when mac lookup fails
- Disable WAN access to node by default
- Fix disabled mesh on multi-wifi devices

- Split rocket-m[52]-xw into different builds
- Enable Rocket M XW (accidentally disabled when splitting out the M2 version)
- Fix wifi setup for multi-radio devices 05/08/2023
- Add missing radios.json for Powerbeam 5AC 400 05/07/2023
- Remove old PBE 100mb fix and /etc/rc.local where it was included
- Fix channel display for 5GHz nodes
- Tidy up the formatting and fix column widths
- Fix syntax error in patch that broke network on many ath79 devices
- Fix ar300m16 wan configuration 04/25/2023
- Fix frequency range reporting and display for 900MHz & 3GHz devices
- Tolerate missing frequency list
- Fix missing POE for nanostation-m
- Remove ar300m nand and nor builds which are causing confusion
- Fix local message refresh

You can find more information on all things AREDN at https://www.arednmesh.org/

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ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

SMT NinoTNC Almost at Pre-Order Stage

A version of the very capable NinoTNC that is implemented in Surface Mount Technology (SMT), assembled and tested, might soon be available. The SMT NinoTNC product page has appeared on the RPC Electronics website, with multiple photos of actual hardware, a price, a part number, and the banner:
Pre-Orders soon!

I'm excited about this development! The NinoTNC is a very capable unit for Amateur Radio Packet Radio, particularly with its capability to use Improved Layer 2 Protocol (IL2P) that incorporates Forward Error Correction (FEC).

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RPC Electronics ESP32-APRS Tracker

I don't know where Jason Rausch K4APR of gets the energy to introduce *two* new products nearly simultaneously, but in addition to the SMT NinoTNC, the product page for the ESP32-APRS Tracker has also appeared on the RPC-Electronics website. This was a product that was first discussed nearly a year ago at the 2022 DCC - Proceedings Paper.

It's quite a combination of technologies brought together in one small unit, including:

- Bluetooth
- Wi-Fi
- USB-C
- Connector for a radio is the Amateur Radio standard 6-pin MiniDIN ("Data" / "9600")
- Modern GPS receiver (with external antenna)
- Onboard sensors - voltage, current, temperature, hummidity, pressure that can be integrated into the APRS transmission.

I haven't bought an APRS tracker in this century (well, other than a Kenwood TM-D710G), and this looks like an exciting new unit for APRS activity in this decade.

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List of VHF/UHF Multimode Amateur Radio Transceivers

Thomas Witherspoon K4SWL on SWLing Post:

> I recently decided to build an EME (Moon Bounce) station. This process has taken me way outside my comfort zone as I'm primarily a 30 MHz and below guy. I'm currently researching radios that have multimode VHF (2 meter band) functionality. I started forming a search list with links in my web browser then realizes this list might serve others who are seeking a new or used multimode VHF/UHF transceiver–especially since I couldn't find anything like it on the web. I've included search links to classifieds in QTH.com, QRZ.com, and eBay. Please leave a comment if I've omitted a transceiver and I'll happily add it.

Leave a comment

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Hack-A-Sat Contest Did Include Amateur Radio Operators

Background:

- Zero Retries 0105 - Hack-A-Sat - Moonlighter Satellite (Literally, Made to be Hacked)
- Zero Retries 0108 - Moonlighter Now in (Independent) Orbit
- Zero Retries 0112 - News from DEF CON 31 (2023) - Three teams won prizes in the Hack-A-Sat contest.

I assumed that there were Amateur Radio Operators were involved in Hack-A-Sat, but never found any details. But Amateur Radio Newsline Number 2391 has such details:

HAMS JOIN GOVERNMENT SATELLITE HACKING EXERCISE

PAUL/ANCHOR: Can amateur radio expertise help hack a government satellite - all in the name of helping the United States tighten up its cybersecurity? Neil Rapp WB9VPG tells us about some hams who did just that.

NEIL: Some of the world's top hackers worked their way into an orbiting cubesat known as Moonlighter to help the US Air Force and US Space Force expose vulnerabilities that could pose cybersecurity threats. The global competition, known as Hack-A-Sat 4, recently announced the winners following the Finalist rounds held in August. A team from Italy, known as HACKeroni captured the top honors.

With skills in RF communications, reverse engineering, satellite operations and vulnerability research paramount to success, a group of 40 full time Northrop Grumman employees - known as SpaceBitsRUs (Space Bits Are Us) took up the challenge too, landing the fourth-place spot. A number of hams were on the team, including Brian Wilkins, KO4AQF, and Wyatt Neal, KD8AQS, the team hacking lead.

Brian, who is a satellite enthusiast, a former AMSAT member and a recipient of the Satellite VUCC award, told Newsline in an email that being a ham helps deliver relevant skills for this kind of challenge. He said [quote]: "Operators gain expertise in radio wave propagation, modulation, and antenna design, allowing them to understand satellite communication protocols and frequencies. Additionally, knowledge of software-defined radio technology enables intercepting, decoding, or modifying satellite signals." [endquote]

It has clearly paid off, not just for the government-sponsored contest but for the Northrop-Grumman team as well, which placed second in the Finals for Hack-A-Sat 3. The real prize, however, is awareness. As Brian told Newsline, this serves as: [quote] "a wake-up call to the industry. Obscurity does not equal Security." [endquote]

This is Neil Rapp WB9VPG.

(BRIAN WILKINS, KO4AQF; HACK-A-SAT WEBSITE)

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Zero Retries 0114 Poll

This poll will remain open through 2023-09-07.

Feedback Loop

Comments from Zero Retries 0113.

Pseudostaffer Dan Romanchik KB6NU wrote:

> Since /r/HamRadio was pluggest in ZR #113, let me also plug /r/amateurradio. /r/amateurradio has more than 124,000 members, and as you can imagine, the discussions are incredibly wide-ranging. I've learned quite a lot myself over the past couple of years as a result of my participation in this subreddit.

Of *course* there would be *(at least) two different* subreddits for Amateur Radio 😝

I'll try to keep up.

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out
Join the Fun on Amateur Radio for some pointers.

Zero Retries Frequently Asked Questions (FAQs) — In development 2023-02.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with radio technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to everyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*

- **Founding Members who generously support Zero Retries financially:**
  Founding Member 0000 - Steven Davidson K3FZT
  Founding Member 0001 - Chris Osburn KD7DVD
  Founding Member 0002 - Don Rotolo N2IRZ
  Founding Member 0003 - William Arcand W1WRA
  Founding Member 0004 - Prefers to remain anonymous

- Numerous Annual and Monthly subscribers who also generously support Zero Retries financially!

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Zero Retries Administrivia - Activating Payment Options.

Want to Support Zero Retries?

- The *most* effective way to support Zero Retries is to simply mention Zero Retries to your co-conspirators that are also interested in knowing more about technological innovation that is occurring in Amateur Radio and encourage them to become a fellow subscriber.

- One particularly effective method of promoting Zero Retries is to add a mention of Zero Retries to your QRZ page (or other web presence) and include a link:

  https://www.zeroretries.org

These blogs and newsletters regularly feature Zero Retries Interesting content:

- Dan Romanchik KB6NU mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.

- Jeff Davis KE9V also mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.

- Amateur Radio Weekly by Cale Mooth K4HCK is a weekly anthology of links to interesting Amateur Radio stories.
- Experimental Radio News by Bennet Z. Kobb AK4AV discusses (in detail) Experimental (Part 5) licenses issued by the US FCC. It's a *must-read-now* for me!
- RTL-SDR Blog - *Excellent* coverage of Software Defined Radio units.
- TAPR Packet Status Register has been published continuously since 1982.
- Other Substack Amateur Radio newsletters recommended by Zero Retries.

These YouTube channels regularly feature Zero Retries Interesting content:

- HB9BLA Wireless by Andreas Spiess HB9BLA
- KM6LYW Radio by Craig Lamparter KM6LYW (home of the DigiPi project)
- Modern Ham by Billy Penley KN4MKB
- Tech Minds by Matthew Miller M0DQW

The Substack email publishing platform makes Zero Retries possible. I recommend it for publishing newsletters.

If you're reading this issue on the web and you'd like to see Zero Retries in your email Inbox every Friday afternoon, just click below to join ~~100~~ ~~200~~ ~~300~~ ~~400~~ *500* ~~600~~ ~~700~~ ~~800~~ *900+* other readers:

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If you're a fellow smart person that uses **RSS**, there *is* an **RSS feed for Zero Retries**.

Zero Retries (N8GNJ) is on Mastodon — n8gnj@mastodon.radio — just click:

Zero Retries / N8GNJ on Mastodon

Email issues of Zero Retries are "instrumented" by Substack to gather basic statistics about opens, clicking links, etc.

More bits from Steve Stroh N8GNJ:

- SuperPacket blog — *Discussing new generations of Amateur Radio Data Communications — beyond Packet Radio (a precursor to Zero Retries)*
- N8GNJ blog — *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs — Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham (The City of Subdued Excitement), Washington, USA.

2023-09-01

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1

YouTube video from Representative Lesko. I tried, mightily, spending way too much time, to *identify which Congressional hearing* this exchange happened, but with my novice skills with the C-Span search engine, I was unable to do so. It would have been instructive to know the context of the hearing, of which the exchange was obviously a minor part.

2

NA2AAA puts his email address in every QST Editorial, so there's little issue in publishing that email address.